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ABSTRACT

This study investigated the effects of English captioning used as knowledge of results feedback during English listening comprehension practice for Taiwanese students. A total of 72 college freshmen at National Taiwan Normal University--36 with above average and 36 with below average English reading proficiency--participated in the study, using an interactive videodisc program 1 hour every 2 weeks over 10 weeks. Two versions of the program, one with captioning and one without, were used. The effects on listening comprehension were measured by both a treatment content-specific listening comprehension test and the listening comprehension sub-test of the Test of English as a Foreign Language (TOEFL). The results indicated that subjects in the captioning treatment had a significantly higher score on the treatment content-specific listening comprehension test. There was no significant difference between the groups on the TOEFL listening comprehension test which measures general comprehension skills. In addition, English reading ability had a significant impact on listening comprehension performance, with the subjects in the above average group performing better than those in the below average group. These results suggest that using captioning for specific content will improve learner comprehension within that content. (58 references) (Author/MES)

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Title:

The Effects of Knowledge of Results Feedback of Captioning on Listening Comprehension of English as a Second Language in Interactive Videodisc System

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Abstract

The effects of English captioning used as knowledge of results feedback during English listening comprehension practice for Taiwanese students were investigated. Seventy-two college freshmen at National Taiwan Normal University participated in the study, using an interactive videodisc program one hour every two weeks over ten weeks. Two versions of the program, one with captioning and one without, were used. The effects on listening comprehension were measured by both a treatment content specific listening comprehension test and the listening comprehension sub-test of the Test of English as a Foreign Language (TOEFL). The results indicate that subjects in the captioning treatment had a significantly higher score on the treatment content specific listening comprehension test. There was no significant difference between the groups on the TOEFL listening comprehension test which measures general comprehension skills. In addition, English reading ability did have a significant impact on listening comprehension performance with those subjects in the above average group preforming better than those in the below average group. These results suggest that using captioning for specific content will improve the learners comprehension within that content. It is possible that exposing students to a wide variety of content areas using captioning may have a positive impact on general listening comprehension skills.

While many Taiwanese students have studied English for at least seven years, they still cannot readily understand movies, TV programs, or class lectures. In addition, many students who take the TOEFL (Test of English as a Foreign Language) receive a low score on the listening comprehension part of the test. This may be because they have English reading and grammar classes but no listening classes in high school, college, or university. Furthermore, many teachers still use the traditional grammar-translation method to teach English. Thus, many students are unable to effectively communicate with native speakers.

Both language teachers and students in Taiwan tend to neglect the importance of listening comprehension skills. They do so because they focus on a final goal of reading. They fail to realize the necessity for developing listening comprehension skills as a prerequisite to developing speaking skills. This basic orientation is reflected in the often-heard question, "Do you speak English?" Obviously, one cannot speak a language unless one can understand it (Chastain, 1988).

Although listening comprehension is of primary importance in second language acquisition (Krasen & Terrell, 1983; Krasen, Terrell, Ehrman, and Herzog, 1984), many contemporary foreign language educators have neglected its importance (Krasen et al., 1984; Paulston & Brunder, 1976; Rivers, 1981). This neglect may stem from the fact that listening is considered a receptive or passive skill and from the belief that merely exposing the student to the spoken language is adequate instruction in listening comprehension (Call, 1985). However, foreign language learners must know the language rules before they can produce language, "competence must precede performance" (Chastain, 1988, p. 91). Thus, Chastain emphasizes that "comprehension activities, such as those students perform in listening and reading, must precede productive activities, that is, speaking and writing" (p. 92). In other words, listening and reading, the receptive skills, are methods for developing and expanding competence.

Postovsky (1974) found that pronunciation of Russian is better when learners are encouraged to listen and not speak during the early stages of instruction. Morley (1985) also proposed that students should not be asked to produce language before they possess enough knowledge to make production possible. In other words, foreign language learners should learn to listen and comprehend first, then speak. That is because early listening instruction allows learners to internalize representations of sound, providing a better basis for producing and evaluating their own speech production (Carroll, 1986).

Listening comprehension is characterized as a highly-complex, problem-solving activity that can be broken down into a set of subskills (Byrnes, 1984). Two of these skills are described by Rivers (1971) as the recognition of component parts of the language (words, phrases, and

clauses) and the memorization of these elements. Recognizing linguistic elements is not sufficient for comprehending what is heard. Listeners must be able to retain these elements in short-term memory long enough to interpret what the elements mean (Call, 1985). In fact, for language learners, understanding the spoken word poses more obstacles than speaking, because in generating speech, learners can control the scope and difficulty of words and expressions. Listeners, however, encounter and decode unfamiliar messages (Wipf, 1984).

Rivers and Temperley (1978) suggest that short-term memory for foreign language words is often overloaded, causing words to be purged before they can be organized and interpreted. Thus, even though second language learners may be able to recognize each word the speakers said, they may not remember lengthy utterances long enough to interpret them. Therefore, this study used short clips in order to allow the learners to process information.

One of the most difficult problems students have in developing listening comprehension is fear (Chastain, 1988). They are afraid that they will be unable to catch every word that the speaker says. They are also concerned that they may not be able to answer the teacher's questions if they do not comprehend every word and every sound.

Ur (1984) argues that there are some other major problems: (1) Foreign language learners do not perceive certain English sounds because these do not exist at all in their native language. For example, Chinese students have difficulty pronouncing and distinguishing the difference between /r/ and /l/ sounds. (2) The English systems of intonation, stress, and rhythm can interfere with the foreign learner's understanding of spoken English. For example, a falling tone on "Pardon me" means "Excuse me", while a rising tone means "Would you please repeat what you said?". (3) Prediction is difficult for ıe foreign-language learner. If he/she can guess what is going to be said next, he/she will be much more likely to understand it well. (4) While it is obvious that a learner would probably not understand a word he/she has not learned yet, the learner also needs to know that certain expressions are common in colloquial English, but taboo in formal style. (5) If a native speaker knows what he/she is going to say next, his/her utterances are often delivered at a tremendous rate. The foreign language learner simply does not have the time to search long-term memory for their meaning. (6) Many learners who are used to the accent of their own teachers or friends are frustrated when they find they have difficulty understanding someone else's accent. For example, some learners can't understand the British English accent, or the southern accent of the United States of America.

Donaldson-Evans (1981) maintains that there are two other common causes that hinder comprehension. First, second language learners lack a sufficient amount of cultural and linguistic knowledge.

Speakers and listeners do not have to share identical backgrounds, but the listener must share enough knowledge to permit comprehension of the speaker's message. Second, the listener does not know a large quantity of vocabulary. Listeners do not have to know the meaning of every word, since vocabulary and idiomatic expressions are the key to comprehension. They comprehend better if they can recognize enough words to establish a context for making rational guesses.

One way to overcome some of these problems might be the presentation of verbatim "captions" and visual cues along with the aural information to be understood. The National Captioning Institute (NCI) points out that "many viewers without hearing impairments find ordinary subtitles ... distracting" (Farrel, 1984). Yet, Education Week (1990) and Price (1983) report that students who are learning English as a second language can significantly improve their language skills by watching closed-captioned television programs. They conclude that "the viewers of closed-captioned TV are better able to understand word meaning and pronunciation, recognize spellings and grasp concepts much more quickly than by reading alone" (Educational Week, 1990, p. 10). There has been little systematic research examining the feedback effect of captions on the learning of foreign languages in interactive videodisc systems. Little is known about how normal hearing viewers learn from captioned material. It is only as we understand more completely the learning process of second-language learners that we can more appropriately design and adapt instruction to meet their needs.

Along with the cues captioning may provide, movies can provide the body language, expression, and contextual cues difficult for teachers to duplicate within foreign language classrooms. Chastain (1988) argues that movies and plays are excellent sources of listening comprehension materials when the teacher can choose appropriate content for use in class. This is important because in Taiwan there is a lack of qualified teachers or experienced native speakers to teach listening comprehension of English as a second language.

Schneider and Bennion (1983) maintain that videodisc-based materials can provide highly motivating course segments for second language learning and fit in well with modern theories of language acquisition. Many studies have indicated that the interactive videodisc is an effective medium for improving listening skills (Javetz, 1986; Kim, 1987; Larson, 1984; Schitai, 1989; Tighe & Zufelt, 1988; Wyatt, 1984), because the interactive video allows students to listen and observe the speaker's body language, facial expressions, and contextual environment. It allows the students to control the program in order to meet their pace and to replay any unclear message immediately. Moreover, interactive videodisc is a cost-effective medium (Fletcher, 1989; West, 1989).

Interactive video allows a teacher to create an environment beneficial to learning in a variety of areas (Sherwood, Kinzer, Hasselbring, Bransford, Williams, & Goin, 1987). Many people have repurposed current popular feature films on videodisc to develop instruction. Allen (1986) maintains that a repurposed film or video contains two types of components that are not present in the original: (1) algorithms that bring the video under the control of the instructional system or the user; (2) additional messages, such as computer text and graphic displays that provide supplementary content.

These programs are based on three theoretical principles: (1) the importance of a contextually rich learning environment; (2) the use of instructional media to direct students' activities; and (3) the development of conceptual tools that students might use and transfer to a variety of settings (Sherwood et al., 1987). They add that there are several advantages in adapting videodisc-based movies for instruction: (1) the availability of material without the production expense and time delay of producing original video; (2) the high production quality of these movies; (3) the "naturally" occurring problem situations found in the movies, and (4) the motivational aspects of popular movies.

The characteristic of interactive video important for this study is the ability to add computer generated messages to the contextually rich environment provided by the video. This ability allows the system to provide very specific feedback about the correctness of the learner's interpretation of the spoken English from the film. This type of feedback is known as knowledge of results (KR) feedback.

Feedback is an important design feature in any instruction. In the nine events of instruction model, Gagne, Briggs, and Wager (1988) emphasize that it is essential to provide information to the learners about the correctness of their performance. However, feedback is the least understood instructional strategy (Cohen, 1985). Results of feedback studies are contradictory. For example, Kulik and Kulik (1988) conducted a meta-analysis on feedback timing and verbal learning and found that immediate feedback is more effective than delayed feedback in actual classroom quizzes and real learning materials. However, "experimental studies of acquisition of test content have usually produced the opposite result" (Kulik and Kulik, 1988, p. 79).

Knowledge of results feedback (KR) is an important source of information for skill learning, although it is not always a necessary condition (Swinnen, Vandenberghe, & Van Assche, 1986). Swinnen et al (1990) argue that knowledge of results feedback generates guidance-like effects from feedback during practice. They also maintain that "KR has a strong informational capability to guide or direct performance when it is present, helping the learner to maintain performance at or near the target" (p. 715). Moreover, Cohen (1985) states that KR allows

the learner to confirm the accuracy of their responses in comprehending and mastering the material. In addition, "it may be necessary to confirm every correct response with KR so that a student feels comfortable with his or her mastery of the material" (p. 35).

However, Cohen (1985) indicates that feedback messages that are too long and time-consuming can slow down the pace of instruction and cause a confident student to feel impatient and frustrated. Swinnen et al. (1990) hold the same point of view. They argue that "KR may at the same time produce certain negative "side effects" that interfere in various ways with longer-term learning such as would be required for performance on a test of retention or transfer" (p. 715). They describe the negative effects as: (1) In simpler tasks, frequent KR encourages the learner to change behavior frequently in an attempt to eliminate errors. Some of the error corrections are very small and they may prevent or reduce the learning. (2) Frequent KR or instant KR can reduce the learning of error-detection capability because there is no time for learners to think about feedback.

One way to overcome the possible negative effects of long KR feedback is to provide visual messages that represent the English as verbatim text, along with repeating the audio. By designing the instruction with short passages, phrases and sentences the length of feedback remains short. Captioning is a good example of the exact order of verbatim that reproduces the words exactly as they are spoken in the movies or in television programs. Because of the limited capacity of short-term memory, the captioning in this study was designed as a short sentence.

In this study, captioning was designed as a function of knowledge of results feedback (KR) which serves as information to the learner that enhances goal attainment (Mayer, 1987; Salmoni, Schmidt, & Walter, 1984; Swinnen, Schmidt, Nicholson, & Shapiro (1990). Learners were encouraged to actively interpret captioning in order to improve listening comprehension. Very little investigation has been conducted on the effect of captioning as knowledge of results feedback.

STATEMENT OF THE PROBLEM

The purpose of this study was to investigate the effect of captioning as knowledge of results feedback on listening comprehension of English as a second language in a computer-based interactive videodisc system. The research questions investigated in this study were:

1. What was the effect of captioning used as knowledge of results feedback on listening comprehension of English as a second language as measured by a listening comprehension test using the

movie The Last Emperor and the TOEFL Listening Comprehension test?

2. Did above average reading proficiency students have higher achievement on a listening comprehension test using the movie The Last Emperor and the TOEFL Listening Comprehension test than below average English reading proficiency students?

3. Was there a statistically significant interaction between treatment and English reading proficiency for performance on a listening comprehension test using the movie The Last Emperor and the TOEFL Listening Comprehension test?

METHOD

Sample

Seventy-two freshmen at National Taiwan Normal University, Taipei, Taiwan, the Republic of China, sixty-one female and eleven male, participated in this study. The average age was 19 years. All subjects were enrolled in the mandatory Freshmen English course. The freshmen population was 1035. Of this population, all English majors and industrial education majors were excluded leaving 955 freshmen. Industrial education majors were not involved in the study because they did not take the Joint College Entranced Examination. Because captioning has a close relationship with reading ability, the subjects of this study were assigned to above or below reading proficiency groups according to their English scores on the Joint College Entrance Examination. The mean and standard deviation for English Achievement on the Joint College Entrance Examination were 58.48 and 13.14 respectively. This left 296 students above and 296 below. Thirty-six above and thirty-six below average English reading proficiency students were randomly selected and randomly assigned to one of two treatment groups so that eighteen high and eighteen low subjects were in each treatment group.

Materials

Two versions of an interactive videodisc program designed around the movie The Last Emperor were developed. One version, the captioning treatment, used captioning as knowledge of results feedback. The second version, the no captioning treatment, received no captioning as part of the feedback. There were no other differences between versions. The Last Emperor was chosen in part because it contains both content and bountiful dialogue that can be used for learning vocabulary, idiomatic expressions, and language comprehension. Most of the students knew the general history of The

Last Emperor, providing some relevance. In addition, the movie included anecdotes used to increase the entertainment effect which were not familiar to the students.

Lesson Description

Once the students booted the computer and initialized the videodisc player, a title screen was presented, then the system would ask the students to type in their student number. The system then confirmed whether he/she was a subject and in which treatment group she/he belonged. If he/she was not a subject then the system would exit. If he/she was a subject then the objectives and directions would be presented in English.

In the captioning treatment group, students watched a complete chapter of The Last Emperor. Then they viewed a series of clips, answering embedded questions about each clip. The embedded questions in the chapter were multiple-choice questions, designed using the same format as the Listening Comprehension subtest of TOEFL. (The TOFEL format consists of spoken statements, short conversations, and several short talks or presentations.) Students were encouraged to comprehend the ideas, the gist, rather than every word. Students were asked to answer using the contextual cues.

If they answered correctly, they reviewed the clip again with captioning used as a knowledge of results feedback to confirm every correct response. The program then branched the students to the next clip. If they answered incorrectly, they reviewed the clip one more time and were asked to answer the question again. If they still answered incorrectly, the captioning was displayed on the monitor, revealing the correct answer. Captioning served as information for the learners to interpret. Learners had only two tries per question and then they continued to the next clip. After completing each chapter, students received a summary display concerning their performance. The system then displayed the menu indicating the previous chapter(s), the next chapter, and quit option. Only those students who were 90% correct on the first try could continue with the next chapter.

In the no captioning treatment group, students received the same videodisc-based program without captioning in the feedback. If they answered a question correctly, they received the positive feedback, but without captions. If they answered incorrectly, they received negative feedback, and viewed that clip one more time and were asked to answer the question again. If they still answered incorrectly, the answer was displayed on the monitor without captioning. There were no other differences between the treatments.

The criterion of 90% correct on the first try was selected to ensure that students had mastered the material before proceeding to the next chapter. Bloom (1976) argues that mastery learning can be used as a

way of eliminating individual differences among students in their ability to learn. Hence, in this study, all of the subjects would have the same mastery level before they took the post-test. If there was a significant difference between the groups, it was because of the treatment effect or the different reading proficiency level.

Procedure

Prior to receiving the treatments, all subjects were given the TOEFL Listening Comprehension subtest, used as a pretest. Then the two treatment groups used The Last Emperor one hour a week in alternating weeks for ten weeks. The captioning group practiced the first week and the no captioning group followed the second week. Most subjects were able to practice the entire program in the 5 hours' time limit. Some subjects had to repeat the same chapter if they were not 90% correct on the first try. At the end of twelve weeks, all subjects took the post-tests: the movie test and a second, equivalent form of the TOEFL Listening Comprehension subtest.

Instruments

The instruments used in this study were a listening test based on the movie The Last Emperor and two equivalent forms of the TOEFL Listening Comprehension test of the Educational Testing Service. They were administered to investigate the knowledge of results effect of captioning on above or below average English reading proficiency using a computer-based interactive videodisc system.

Validity and Reliability of the Movie Test

The test based on the movie The Last Emperor was constructed using the same format and with the same number of questions as the TOEFL Listening Comprehension subtest: fifty multiple-choice questions administered in thirty-five minutes. In addition, none of the questions in the movie test were the same as the embedded questions in the treatments. The test was recorded from the videodisc program of The Last Emperor using audio only, and consisted of spoken statements, short conversations, and several short talks.

In order to decide if the test items were appropriate, two American graduate students and one Chinese professor who teaches listening comprehension of English as a second language conducted an item analysis of the movie test. The following Likert-type scale was used: (1) Very Inappropriate, (2) Inappropriate, (3) Undecided, (4) Appropriate, and (5) Very Appropriate. Only test items scored on or above the Appropriate level by all three raters were used. A split-half reliability of the movie test was conducted, using the Spearman-Brown

formula to estimate the reliability of the whole test. The split-half reliability coefficient of the movie test was .71.

Statistical Design

This study was a pretest-posttest control group design (Campbell & Stanley, 1963). The dependant variable, listening comprehension, was analyzed with a 2x2 (treatment x reading proficiency) analysis of covariance (ANCOVA) to test the following research hypotheses:

1. Students in the captioning as knowledge of results feedback treatment have significantly higher posttest mean scores on the movie test than students in the no captioning treatment.
2. Above average English reading proficiency students have significantly higher posttest mean scores on the movie test than below average English reading proficiency students after completing the treatments.
3. There is a significant interaction between treatment and reading proficiency for posttest mean scores on the test of movie The Last Emperor.
4. Students in the captioning as knowledge of results feedback treatment have significantly higher posttest mean scores on the TOEFL Listening Comprehension subtest than students in the no captioning treatment.
5. Above average English reading proficiency students have statistically higher posttest mean scores on the TOEFL Listening Comprehension subtest than below average English reading proficiency students after completing the treatments.
6. There is a significant interaction between treatment and reading proficiency for posttest mean scores on the TOEFL Listening Comprehension subtest.

Analysis of covariance reduces the effects of initial group differences statistically by making adjustments to post-test scores. The TOEFL pretest score was used as the covariate to adjust for both post-test scores.

Results

Each individual used the interactive videodisc program for five hours over ten weeks. The program consisted of seven chapters. Chapters one, two, three, and six took an average of 50 minutes to complete. Chapters four, five, and seven took an average of 30 minutes to complete. Because of the subjects' tight class schedules, the study was conducted in the evening and at noon, even on Saturday and Sunday. All subjects completed the first six chapters. Two subjects

of below average reading proficiency in the captioning group completed all of seven chapters.

All hypotheses were tested at the a = 0.05 level of significance. The analysis of covariance (ANCOVA) was employed to evaluate the strength of the treatment based on the movie test of The Last Emperor and listening comprehension scores of TOEFL, using the pre-test performance scores of the TOEFL Listening Comprehension test as the covariate. The results of the pretest and both posttests are shown in Table 1.

Insert Table 1 about here

Hypotheses Testing Related to the Movie Test

The first analysis of covariance was used to determine the effects of the treatment and reading proficiency on performance on the movie test of The Last Emperor. The dependent variable, listening comprehension, was analyzed with a 2x2 (Treatment x Level of Reading Proficiency) analysis of covariance. The pretest of the movie test was used as covariate to adjust for post-test score.

The interaction of treatment and reading proficiency was analyzed to determine if high or low reading proficiency students differed with or without captioning on the movie test. As shown in Table 2, there was no interaction between treatment and reading proficiency, $F(1, 67) = 2.16$, $p = .15$ ($> .05$).

Insert Table 2 about here

Since there was no interaction, the main effects of treatment and reading proficiency were examined. Table 2 indicates that there was a statistically significant difference between groups due to the treatment, $F(1, 67) = 144.21$, $p < .01$ ($a < .05$). Subjects who received the captioning treatment had higher posttest mean scores on the movie test.

Table 2 also shows that there was a statistically significant difference between the above average English reading proficiency group and the below average English reading proficiency group on the movie test, $F(1, 67) = 34.25$, $p < .01$ ($a < .05$). Students in the above average reading proficiency group performed significantly better on the movie test.

Hypotheses Testing Related to the TOEFL Listening Comprehension Test

The second analysis of covariance was used to measure the effects of the treatment and reading proficiency on performance on the TOEFL Listening Comprehension test. The dependent variable, listening comprehension, was analyzed with a 2x2 (Treatment x Level of Reading Proficiency) analysis of covariance. TOEFL pre-test was used as covariate to adjust for post-test score.

Insert Table 3 about here

As in the case of the movie test, Table 3 shows that there was no interaction between treatment and reading proficiency, $F(1, 67) = 1.43$, $p = .24$ ($> .05$). Table 3 also indicates that the main effect of the treatment was not statistically significant, $F(1, 67) = 0.68$, $p = .41$ ($a > .05$). Subjects who received the captioning treatment had no statistically higher post-test mean scores on the TOEFL Listening Comprehension test than students who received the no captioning treatment.

However, Table 3 does show a statistically significant difference between the above average English reading proficiency group and the below average English reading proficiency group on the TOEFL Listening Comprehension subtest, $F(1, 67) = 26.72$, $p < .01$ ($a < .05$). The above average reading proficiency group performed better than the below average reading proficiency group.

Summary of the Findings

Statistical analysis of the data from this study led to the following findings:

1. Based on the analysis of covariance, there was a statistically significant difference between the treatment groups on scores on the movie test, such that the captioning group performed better than the no captioning group.
2. The analysis of covariance also showed that there was a statistically significant difference between reading proficiency groups in post-test mean scores on the movie test in favor of the above average reading proficiency group.
3. The analysis of covariance revealed that there was no interaction between treatment and reading proficiency in post-test mean scores on the movie test.
4. The analysis of covariance indicated that there was no statistically significant difference between the treatment groups mean scores on the TOEFL Listening Comprehension test.
5. The analysis of covariance showed that there was a statistically significant difference between reading proficiency groups in

post-test mean scores on the TOEFL Listening Comprehension test, in favor of the above average reading proficiency group.

6. The analysis of covariance revealed that there was no interaction between treatment and reading proficiency in post-test mean scores on the TOEFL Listening Comprehension test.

DISCUSSION

The results of this study indicate that there is no interaction between treatment and reading proficiency for post-test mean scores on the movie test and the TOEFL Listening Comprehension subtest. Further, they show that students who receive captioning as knowledge of results feedback on the interactive videodisc program have statistically higher post-test mean scores than students who receive no captioning on the movie test. This finding is consistent with the findings of Boyd and Vader (1972) and Murphy-Berman and Jorgensen (1980).

Therefore, it seems that captioning is effective on listening comprehension of the specific subject matter presented. This result is inconsistent with the findings of Branvold, Chang, Probst, and Bennion (1986), who investigated the effectiveness of an interactive videodisc workstation in teaching content, vocabulary, and idiomatic expressions using the movie Raiders of the Lost Ark. Significant differences in effectiveness between workstations were found only in the area of idiomatic expressions. The current study does not specifically address idiomatic understanding, though idiomatic expressions are very important for understanding content. However, this study does find an effect on specific content comprehension.

The results also show that students in the above average reading proficiency group have higher posttest mean scores than the below average reading proficiency group on the movie test and on the TOEFL Listening Comprehension test. Therefore, listening comprehension has a close relationship with reading proficiency. This finding is again congruous with the findings of Murphy-Berman and Jorgensen (1980). It is suggested that students trying to improve their English listening comprehension skills should learn more about written English vocabulary and idiomatic expressions, as well as auditory intonation and stress of vocabulary. Additionally, students need to learn more about slang or common expressions that are usually heard in television programs, in the movies, and in daily life.

During the study, informal observation revealed that subjects used background knowledge in listening comprehension. They knew the history and the main characters of the movie The Last Emperor. This observation is consistent with the findings of Johnson (1981), Kitao (1989), Long (1989, 1990), Samuels (1984), and Van Dijk (1980).

This use of background knowledge is not likely to be a confounding variable since subjects were randomly assigned to groups and the content was the same for all subjects. Background knowledge has no effect on the TOEFL Listening Comprehension test, because TOEFL test is developed for evaluating students' general English proficiency.

Schema or cultural background knowledge is an essential component of second language comprehension. However, Kitao (1989) argues that second language classes generally use the grammar-translation method, which does not emphasize the use of background knowledge. This is true in Taiwan. Previous studies indicate that schemata can be taught (Brooks & Dansereau, 1983; Brown, Smiley, Day, Townsend, & Lawton, 1977). Hence, second language educators need to know which instructional designs and strategies for teaching scripts (schema) will be most effective and efficient in specific instructional environments. It is possible that background knowledge helped students understand the content and context of the movie The Last Emperor. The effect of background knowledge remains to be investigated.

In this study, captioning as KR feedback was provided under two conditions in the captioning treatment group. When a subject answered correctly, captioning was provided after a delay of three seconds. When a subject answered question incorrectly twice, captioning was also provided after a delay of three seconds. Hence, the captioning feedback may be regarded as delay of knowledge of results feedback. Swinnen et al. (1990) investigated motor skills learning under three conditions: (1) an instantaneous KR condition in which subjects received KR immediately after response completion, (2) a delayed KR condition in which subjects had a KR-delay interval of eight seconds, and (3) an estimation condition in which subjects were required to estimate their movement time during an eight seconds KR-delay interval. They report that because instantaneous KR provides the learners with information about the success of their response, it reduces the subjects' motivation to evaluate their responses as frequently or intensively as subjects in the delayed or estimation conditions. Thus, "instantaneous KR can discourage the processing of other kinds of information, such as intrinsic response-produced feedback that would lead to the learning of the capability to detect errors in future performances" (p. 715). They conclude that instantaneous KR degrades learning because it reduces the development of error-detection capabilities.

Although the Swinnen et al. (1990) study was not conducted using interactive video, any one of the three KR conditions could be applied to the design of an interactive videodisc program. During the current study, it was informally observed that subjects were actively examining the captioning in order to find out what they

misunderstood when they answered incorrectly. This learning process may lead to learning error-detection capabilities and actively involves the student in caption interpretation. Subjects took notes, consulted an English dictionary or idiomatic handbook, or discussed the results with the investigator. These observations provide evidence that knowledge of results feedback has a strong informational property that encourages subjects to use this information for performance enhancement. KR also allows subjects to feel comfortable with their mastery of the material. These findings are consistent with the findings of Swinnen et al. (1990) and Cohen (1985).

During the experiment, subjects were observed operating the interactive videodisc system, and informally interviewed. Subjects indicated that the interactive videodisc program was highly motivational and interesting. This observation is consistent with the finding of Branvold et al. (1986), Koskinen, Wilson, & Jensema (1986), and Kearsley (1990). Some subjects added that the material was easy to understand because of the contextual cues, body language, and facial expressions of the speakers. However, one cannot be certain that the students' high motivation is not due to the use of the new technology of interactive video. Hence, the motivation issue must be investigated. Such investigation requires longer treatments, experienced users of the technology, and a measuring instrument for motivational effect.

An alternative approach to investigate the motivation issue would be the use of Keller's ARCS model (1987) as the basis for analyzing the motivational design of the instructional treatment. ARCS is an acronym that stands for attention, relevance, confidence, and satisfaction. With respect to attention, the movie The Last Emperor has won many Oscar Awards and tells a fascinating story. It gains and maintains student attention. With respect to relevance, Taiwanese students are familiar with the content of The Last Emperor and it relates to their modern Chinese history class. Students may be motivated to compare what they see in the movie with what they study in their textbook. With respect to confidence, in this program, 90% correct on the first try of answering the embedded questions was necessary to move to the next chapter. Learners are aware of evaluative criteria and performance requirements (Keller & Kopp, 1987). In addition to stimulating the need to achieve, it also helps build an expectancy that success will be due to personal effort if the goal is achieved (Keller & Kopp, 1987). With respect to satisfaction, KR allows subjects to feel comfortable with their mastery of the material. In addition, "The knowledge of results promotes learning by confirming correct responses and correcting wrong ones, but it also has a motivational effect in that it allows the achievement-motivated person to get a measure of success" (Keller & Kopp, 1987, p. 315).

The treatment used in this study had no apparent impact on general listening comprehension skills. However, this may be due to the use of only one videodisc program and limited practice. It is difficult to master listening comprehension of a second language with only five hours practice over ten weeks on only one content area. It is possible that an effect on the general listening skills measured by the TOEFL Listening Comprehension test could be achieved if more videodisc programs on a wide variety of topics were used and if much more practice time was provided for the students.

Conclusions and Implications

In consideration of the limitations in this study and the statistical analysis of the data, the following conclusions were drawn:

1. Based on the finding that significant differences existed between the treatment groups on the movie test, it was concluded that captioning used as knowledge of results feedback improves listening comprehension on specific content for Taiwanese college freshmen students.
2. Based on the finding that no significant differences existed between the treatment groups on the TOEFL Listening Comprehension subtest, it was concluded that the captioning used as knowledge of results feedback does not improve general listening comprehension skills. However, this result may be due to limited exposure to the treatment: five hours over ten weeks. It may also be due to the lack of content variety.
3. Based on the finding that significant differences also existed between the above average English reading proficiency group and the below average English reading proficiency group on the movie test and the TOEFL Listening Comprehension subtest, it was concluded that English listening comprehension may be closely related to English reading proficiency.
4. Informal interviews with some subjects during the study indicated that they were not embarrassed or intimidated when they could not understand the content of the videodisc program. They stated that the learning experience was pleasant and free from anxiety. From these comments it may be concluded that the videodisc and microcomputer technologies have demonstrated a friendly environment that can be easily integrated into teaching foreign languages and reduce students' anxiety and embarrassment.

The present results have implications for educational practice. Informal observations suggest that captioning as KR may encourage the learners to examine new vocabulary, idiomatic expressions, and their usage. Captioning as knowledge of results feedback does appear to encourage learners to actively interpret the information, draws

learners attention, and facilitates the learning of a second language. However, the findings show that the specific content treatment did not improve general listening comprehension skills. If the goal is to improve general listening comprehension, then treatments of covering many different subject areas may be used. If the goal is to improve comprehension of specific content then captioning provides a tool to assist the learner.

The current findings and students' reactions suggest that an interactive videodisc system has the potential to improve English as a second language learning. This is especially important since qualified English language teachers for listening and speaking skills are in short supply in Taiwan and learners differ widely in entry skills.

Table 1
Pre-test and Post-test for the TOEFL Listening Comprehension and the Movie Test

Reading Proficiency	Treatment	Captioning			No Captioning	
		n	M	SD	M	SD
Above Average	TOEFL Pre-test	36	42.94	4.32	41.67	3.55
	TOEFL Post-test	36	46.56	3.90	45.67	2.99
	Movie Post-test	36	66.72	1.36	60.39	2.30
Below Average	TOEFL Pre-test	36	39.17	2.50	39.94	3.70
	TOEFL Post-test	36	41.44	3.22	41.17	3.84
	Movie Post-test	36	62.83	2.43	55.50	3.82

Table 2

Two-Way Analysis of Covariance for the Movie Test by Treatment and Reading Proficiency

Source	SS'	df	MS'	F	p
Covariates	263.85	1	263.85	46.37	
Treatment (T)	820.58	1	820.58	144.21*	< .01
Reading Proficiency (R)	194.90	1	194.90	34.25*	< .01
T x R	12.28	1	12.28	2.16	.15
Within	381.52	67	5.69		
Total	1662.61	71			

*.95$F_{1,67}$ = 3.99, a < .05.

Note: "The SS do not normally add up to the model SS." (SAS/STAT user's guide, 1990, p. 936).

Table 3
Two-Way Analysis of Covariance for the TOEFL Listening Comprehension Test by Treatment and Reading Proficiency

Source	SS'	df	MS'	F	p
Covariates	900.85	1	900.85	239.50	
Treatment (T)	2.56	1	2.56	.68	.41
Reading Proficiency (R)	100.49	1	100.49	26.72*	< .01
T x R	5.37	1	5.37	1.43	.24
Within	252.01	67	3.76		
Total	1261.28	71			

*$.95F_{1,67} = 3.99$, $a < .05$.

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